

REMARKS

Claims 1-9, 12, 14-36, 38, 40, 44-53, 56, 58-82, 84, 89, 91, 92, 94, 95, 97, 98, 100-108, 111-113, 115-120, 122, 126-133 and 136-145, 147 and 151-162 are pending. Claims 10, 11, 13, 37, 39, 41-43, 54, 55, 57, 83, 85-87, 90, 93, 96, 99, 109, 110, 114, 121, 123-125, 134, 135, 146 and 148-150 have been cancelled. Claims 1, 45, 89, 92, 95, 98, 101, 122, 126, 147 were amended on December 19, 2006, in conjunction with a Request for Continued Examination filed in response to the Final Office Action mailed June 19, 2006.

Claims 1-5, 89, 92, 101 and 126 stand rejected under 35 U.S.C. § 103(a) as being anticipated by EP 0849685 to Vogley in view of U.S. Patent No. 6,529,534 to Yasuda. Applicants respectfully request reconsideration of this rejection.

Claim 1 recites, *inter alia*, a “memory system” including “a memory controller” and at least one “memory storage device.” The memory system includes “a continuous optical path coupled to said memory controller and to said memory bus” and “a wavelength-adjustable electro-optical converter.” The optical path comprises “a first wavelength-adjustable electro-optical converter arranged and configured for exchanging data between said controller and said at least one memory storage device.” The “memory controller, memory bus and continuous optical path [are] formed on a single die.”

Yasuda and Vogley do not disclose, teach or suggest these features, including the additional limitation of a “memory controller, memory bus and continuous optical path being formed on a single die.” These limitations were formerly recited in cancelled dependent claim 39; by not rejecting claim 39, which contained all the limitations of currently amended claim 1, under Yasuda and Vogley alone, the Office Action implicitly admits that Yasuda and Vogley alone do not disclose, teach or suggest these features. Accordingly, the rejection should be withdrawn.

The Office Action relies on U.S. Patent No. 5,544,319 to Acton for the disclosure of a “memory controller, memory bus and continuous optical path being formed on a single die” with respect to claim 39, but Acton does not disclose, teach or suggest these features, and cannot now be relied upon with respect to amended claim 1. The Office Action inaccurately states at

page 7 that “Acton discloses in figure 1, controller 1, at least one memory device 5, and optical path 4 are all integrated on the same die.” However, Figure 1 of Acton, reproduced below, contains no such disclosure. There is no disclosure of, *inter alia*, any of the elements of the block diagram of Figure 1 being contained on the same die, and indeed, there is no mention of the word “die” or “package” anywhere in the Acton patent. Accordingly, just as the original rejection of cancelled claim 39 was improper because Vogley, Yasuda and Acton all fail to disclose all the elements of the claim, a new rejection of amended claim 1, which contains all the

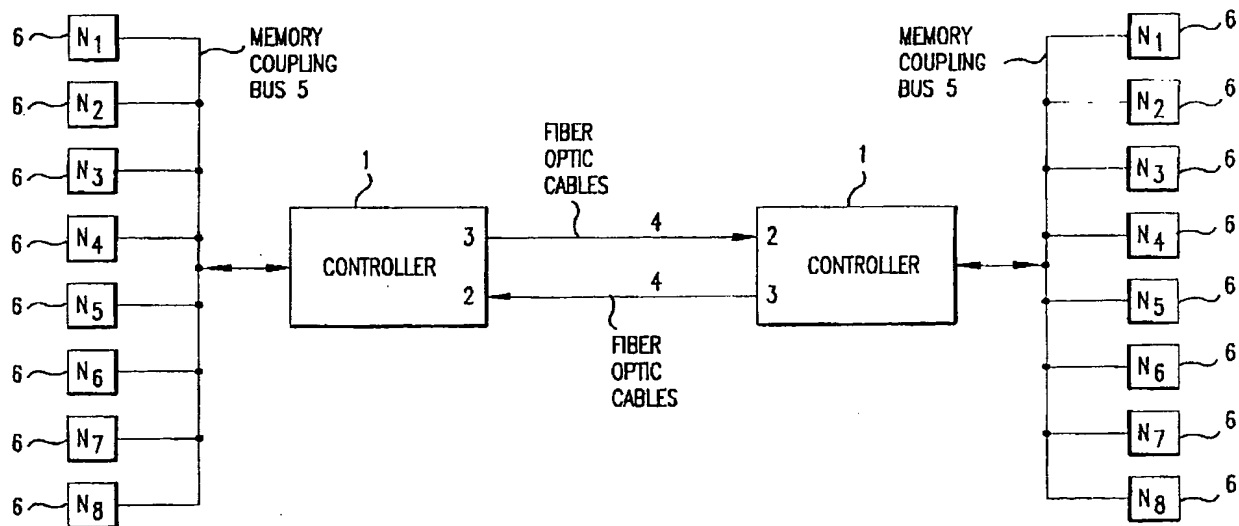


FIG. 1

limitations of cancelled claim 39, would likewise be improper for at least the same reasons.

In addition, the Office Action admits that Vogley fails to disclose “a wavelength-adjustable electro-optical converter.” The Office Action relies on Yasuda as disclosing a wavelength adjustable optical transmitter, but there is no motivation to combine Yasuda with Vogley, stating that replacing the non-adjustable optical transmitter of Vogley with the wavelength adjustable transmitter of Yasuda “eliminates the problem of drift,” but there is no indication in Vogley, Yasuda, or anywhere else, that drift would be a problematic issue with the transmitter of Vogley. In fact, Yasuda states that drift is generally introduced through “secular degradation of the laser diode or the temperature sensor,” none of which are present or

contemplated by Vogley. Accordingly, one of ordinary skill would not have looked to Yasuda or elsewhere, because secular degradation of the laser diode or the temperature sensor was not an issue in the Vogley sensor. The Office Action has not applied the proper test for obviousness; accordingly, the Office Action fails to make a *prima facie* case of obviousness.

Applicants respectfully submit that there is no motivation to combine the cited references to obtain the invention of claim 1. Motivation or suggestion to combine or modify prior art references “must be clear and particular, and it must be supported by actual evidence.” *Teleflex, Inc. v. Ficosa North America Corp.*, 299 F.3d 1313, 1334 (Fed. Cir. 2002). Because the “genius of invention is often a combination of known elements which in hindsight seems preordained,” the Federal Circuit requires a “rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.” *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001). Yet there is no teaching or suggestion within any of the references that provide a motivation to combine them.

Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. *See e.g., In re Dembiczak*, 175 F.3d 994 (Fed. Cir. 1999); *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998); *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996); and MPEP §§ 706.02(j) and 2143 *et seq.* Furthermore, the “[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).” MPEP §706.02(j).

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680 (Fed. Cir. 1990). Thus, a showing of an obvious combination requires more than just an amalgam of references, each of which provides one feature of the claimed invention.

The Office Action has done no more than cite a pair of references, each of which allegedly provides only part of the claimed invention, and allege that their combination renders the invention obvious. However, without the benefit of hindsight, there would have been no motivation to combine these references and the Office Action has failed to provide proof of any such motivation.

Accordingly, there is no disclosure, teaching or suggestion in Vogley, Yasuda (or Acton) for the claimed limitations. For at least the above reasons, Applicants respectfully request that claim 1 and all dependent claims be allowed.

Claim 89 recites, *inter alia*, an electro-optical converter for a memory system that includes “at least one input for receiving an electrical data signal from a memory controller,” and “at least one wavelength-adjustable device arranged and configured to convert said data signal to an optical signal.” At least one optical output is “arranged and configured to transmit said optical signal into an optical path coupled to a memory storage device, said optical output, optical path and memory module being formed on a single die.” As discussed above with respect to claim 1, there is no disclosure in Yasuda, Vogley, or any other cited reference (including Acton), of, *inter alia*, an “optical output, optical path and memory module being formed on a single die.” In addition, there is no motivation to combine “a wavelength-adjustable device” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claim 1. Accordingly, Applicants respectfully request that claim 89 and all dependent claims be allowed. .

Claim 92 recites, *inter alia*, an electro-optical converter for a memory system that includes “at least one input arranged and configured to receive an electrical data signal from at least one memory storage device,” and “at least one wavelength-adjustable device arranged and configured to convert said data signal to an optical signal.” The memory system also includes “at least one optical output arranged and configured to transmit said optical signal into an optical path,” with “said optical output, optical path and memory controller being formed on a single die.” As discussed above with respect to claim 1, there is no disclosure in Yasuda, Vogley, or any other cited reference (including Acton), of, *inter alia*, an “optical output, optical path and memory controller being formed on a single die.” In addition, there is no motivation to combine

“a wavelength-adjustable device” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claim 1. Accordingly, Applicants respectfully request that claim 92 and all dependent claims be allowed.

Claim 101 recites, *inter alia*, a method of operating a memory system comprising “receiving an electrical signal output from a memory controller” and “converting said electrical signal output from said controller to an optical signal for transmission on said optical path, said conversion step further comprising adjusting the wavelength of said optical path.” The method also includes “transmitting said optical signal over an optical path to a memory module; said memory module, optical path and memory controller being formed on a single die.” As discussed above with respect to claim 1, there is no disclosure in Yasuda, Vogley, or any other cited reference (including Acton), of, *inter alia*, a “memory module, optical path and memory controller.” In addition, there is no motivation to combine the act of “adjusting the wavelength of said optical path” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claim 1. Accordingly, Applicants respectfully request that claim 101 and all dependent claims be allowed.

Claim 126 recites, *inter alia*, a method of operating a memory system comprising “receiving an electrical signal output from at least one memory storage device; converting said electrical signal output from said memory storage device to an optical signal for transmission on said optical path, said conversion step further comprising adjusting the wavelength of said optical path” and “transmitting said optical signal over an optical path to a memory controller controlling said at least one memory storage device; said memory storage device, optical path and memory controller being formed on a single die.” As discussed above with respect to claim 1, there is no disclosure in Yasuda, Vogley, or any other cited reference (including Acton), of, *inter alia*, a “memory storage device, optical path and memory controller being formed on a single die.” In addition, there is no motivation to combine the act of “adjusting the wavelength of said optical path” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claim 1. Accordingly, Applicants respectfully request that claim 126 and all dependent claims be allowed.

Accordingly, Applicant respectfully requests that the above rejection of claims 1-5, 89, 92, 101 and 126 be withdrawn and the claims allowed.

Claims 6-8, 12, 14, 24-36, 38-41, 44-51, 53, 56, 58, 68-71, 73-85, 88, 91, 94, 95, 97, 98, 100, 102-107, 115-123, 127-132, 139-148, 150, 151, 155 and 159 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Vogley in view of Yasuda, and further in view of U.S. Pat. No. 5,544,319 to Acton et al. (Acton). Applicants respectfully request reconsideration of this rejection.

Claims 6-8, 10, 12, 14, 24-36, 38-41, 44 and 151 depend from claim 1. The deficiencies of Vogley, Yasuda and Acton with respect to claim 1 have been discussed above. Acton et al. discloses an optical link between two memory coupling system controllers, and does not cure the noted deficiencies of Vogley and Yasuda.

Claim 45 recites, *inter alia*, a computer system including, *inter alia*, a memory system connected to a processor. The memory system includes “a memory controller” and “at least one memory storage device.” The memory system also includes an “optical path coupling said memory controller with said at least one memory storage device for optically exchanging data between said controller and said at least one memory storage device” and “a wavelength-adjustable electro-optical converter arranged and configured to convert an electrical signal output from said memory controller to an optical signal for transmission on said optical path, said memory controller, bus and continuous optical path being formed on a single die.”

As discussed above with respect to claims 1, 89, 92, 101 and 126, there is no disclosure in Yasuda, Vogley, Acton, or any other cited reference, of, *inter alia*, a “memory controller, bus, and continuous optical path being formed on a single die.” In addition, there is no motivation to combine “a wavelength-adjustable electro-optical converter” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claims 1, 89, 92, 101 and 126. Accordingly, Applicants respectfully request that claim 45 and all dependent claims be allowed..

Claim 91 depends from claim 89. The deficiencies of Vogley, Yasuda and Acton with respect to claim 89 have been discussed above. As such, claim 91 is allowable over the cited combination.

Claim 95 recites, *inter alia*, an electro-optical converter for a memory system comprising “at least one input arranged and configured to receive an optical data signal from an optical path coupled to a memory storage device.” At least “one wavelength-adjustable electro-optical converter is arranged and configured to convert said received data signal to an electrical signal.” At least “one electrical output is arranged and configured to transmit said output signal to an electrical path of a memory controller; said input, optical path and memory module being formed on a single die.”

As discussed above with respect to claims 1, 89, 92, 101 and 126, there is no disclosure in Yasuda, Vogley, Acton, or any other cited reference, of, *inter alia*, an “input, optical path and memory module being formed on a single die.” In addition, there is no motivation to combine “a wavelength-adjustable electro-optical converter” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claims 1, 89, 92, 101 and 126. Accordingly, Applicants respectfully request that claim 95 and all dependent claims be allowed.

Claim 98 recites, *inter alia*, an electro-optical converter for a memory system comprising “at least one input arranged and configured to receive an optical data signal from an optical path,” and “at least one wavelength-adjustable electro-optical converter arranged and configured to convert said received optical data signal received by said at least one input to an electrical signal.” The memory system also includes at least “one electrical output arranged and configured for transmitting said output electrical signal to an electrical path of a memory storage device; said input, optical path and memory controller being formed on a single die.”

As discussed above with respect to claims 1, 89, 92, 101 and 126, there is no disclosure in Yasuda, Vogley, Acton, or any other cited reference, of, *inter alia*, an “input, optical path and memory controller being formed on a single die.” In addition, there is no motivation to combine “a wavelength-adjustable electro-optical converter” with Vogley or any other reference, alone or in combination for the reasons discussed above with respect to claims 1, 89, 92, 101 and 126. Accordingly, Applicants respectfully request that claim 98 and all dependent claims be allowed. Claims 102-107, 115-120, 122a and 159 depend from claim 101. The deficiencies of Vogley, Yasuda and Acton with respect to claim 101 have been discussed above. As such, claims 102-107, 115-123 and 159 are allowable over the cited combination.

Claims 127-132 and 139-147 depend from claim 126. The deficiencies of Vogley, Yasuda and Acton with respect to claim 126 have been discussed above. As such, claims 127-132, 139-148 and 150 are allowable over the cited combination.

Claims 9, 15-23, 42, 43, 52, 59-67, 86, 87, 108, 111-113, 124, 125, 133, 136-138, 149, 152-154, 156-158, and 160-162 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Vogley in view of Yasuda, further in view of Acton et al. and further in view of U.S. Pat. No. 6,658,210 to Fee. Applicants respectfully request reconsideration of this rejection.

Claims 9, 15-23 and 151-154 depend from 1. Claim 1 is patentable over Vogley in view of Yasuda and Acton et al. Fee has not been cited against claim 1, and in any event would not combine with Vogley in view of Yasuda and Acton et al. to establish *prima facie* obviousness. Claim 1 and its dependent claims are patentable over the combination of cited references to Vogley, Yasuda, Acton et al. and Fee.

Claims 52, 59-67 and 156-158 depend from claim 45. Claim 45 is patentable over Vogley, in view of Yasuda and further in view of Acton et al. Fee has not been cited against claim 45, and in any event would not combine with Vogley in view of Yasuda and Acton et al. to establish *prima facie* obviousness. Claim 45 and its dependent claims are patentable over the combination of cited references to Vogley, Yasuda, Acton et al. and Fee.

Claims 108, 111-113 and 160-162 depend from claim 101. Claim 101 is patentable over Vogley, in view of Yasuda and further in view of Acton et al. Fee has not been cited against claim 101. Even if Fee had been properly cited against claim 101, the proposed combination with Acton et al. would not establish *prima facie* obviousness. Claim 101 and its dependent claims are patentable over the proposed combination of Vogley, Yasuda, Acton et al. and Fee.

Claims 133 and 136-138 depend from claim 126. Claim 126 is patentable over Vogley, in view of Yasuda and further in view of Acton et al. Fee has not been cited against claim 126, and even if properly cited would not combine with Acton et al. to render claim 126

prima facie obvious. Claim 126 and its dependent claims 127-150 are patentable over the proposed combination of Vogley, Yasuda, Acton et al. and Fee.

Accordingly, the Office Action again does not demonstrate motivation to combine Fee with the combined teachings of Vogley, Yasuda, and Acton (a total of *four* different references) to arrive at the patented invention. Applicant respectfully requests that the rejection of claims 9, 15-23, 52, 59-67, 108, 111-113, 133, 136-138, 152-154, 156-158, and 160-162 be withdrawn and the claims allowed.

In view of the above, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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